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SCIENCE

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FRIDAY, APRIL 21, 1899.

OTHNIEL CHARLES MARSH.

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THE last of the famous trio of American vertebrate paleontologists has passed into the unknown, and the rich legacy of discovery and advancement in biological knowledge which they have bequeathed to the world will ever stand as an enduring monument to their untiring energy and greatness in the realm of thought. It seems, therefore, especially fitting that the unveiling of this splendid monument and the final pronouncing of judgment upon the labors of these truly great Americans should take place in the closing years of the century, notable alike for the variety and brilliancy of its achievements in almost every department of learning.

At the time when the doctrine of Evolution was finally formulated and brought prominently before the thinking world by the labors of Darwin the direct and positive evidence in favor of such an hypothesis was inconclusive and uncertain. True, it received more or less powerful support from Mr. Darwin's own particular field of research, as well as from the embryological studies which the Germans had brought into especial prominence, but the court of the last resort, the tribunal of final judgment in which the case was to be argued and decided was that of the Geological Record, or, in other words, a direct appeal to the animals and plants themselves, which had inhabited the earth in times

metallurgy of individual metals, the few books on general metallurgy were arranged as text-books and made no pretence of thoroughness of detail or treatment. With these facts in mind the present work was compiled, with the stated object of giving a complete account of the metallurgical treatment of every one of the metals ordinarily employed, together with the recent improvements in the art, stating the underlying scientific principles and illustrating by actual practice.

This object is highly commendable, but the statement is rather misleading, as iron and steel have been entirely omitted and no mention made of the omission or of a subsequent volume upon this all-important branch of metallurgy. This fact should have been stated plainly by the author in the preface and by the publisher in the advertisements.

Dr. Percy's historic work was selected as the basis, and on this are grouped many facts from the works of modern writers, notably Hofman, on lead; Peters, on copper; Egleston, on gold and silver, and Borchers on electro-metallurgy. The work is quite exhaustive in character, as the grand total of 1608 pages indicates, but, unfortunately, the exhaustion is not limited to the subject-matter of the book and oftentimes extends to the reader, as much of the material is vague and unnecessarily verbose. The work lacks that clearness of description, lucidity of arrangement and conciseness of statement so needful in the treatment of a large subject and so appreciated by American readers with whom time is an object.

It is to be regretted that much ancient material is perpetuated in excruciating detail, particularly as it is so interwoven with modern practice that the general reader is left in doubt what is in use at the present time. To illustrate this, under the chapter on silver, barrel amalgamation is quoted as now in use at the Pelican Mill, Georgetown, Colo., while, as a matter of fact, it was there abandoned twenty years ago. Another instance, under the chapter on zinc, the furnace used in the old English process—that rare bird of antiquity—shows forth resplendent in full detailed illustration. As to this furnace, Dr. Percy, in 1869, failed to find even the ruins of its foundation.

The large amount of material collected in these two volumes contains much of value to the specialist, but it is too encyclopedic in character to be of any marked assistance to the general reader. Its main value is for reference in a scientific or technical library.

A few minor errors, such as the location of Boston in Vermont (Vol. 1, p. 115) and Orford in New Jersey (Vol. 2, p. 104), may be overlooked in a work of this large size.

The criticism of this work may be considered harsh, but the eminent position occupied by Dr. Schnabel leads one to expect the highest standard of work and to be disappointed if it is not attained.

J. STRUTHERS.

BOOKS RECEIVED.

Organic Chemistry. Edited by R. ANSCHÜTZ. Authorized translation by EDGAR F. SMITH. Vol. I., Chemistry of the Aliphatic Series. Philadelphia. P. Blakiston's Son & Co. 1899. Pp. xviii + 625. \$3.00.

Commercial Organic Analysis. ALFRED H. ALLEN, Philadelphia, P. Blakiston's Son & Co. 1899. Vol. II., Part I. Pp. x + 337. \$3.50.

The Spirit of Organic Chemistry. ARTHUR LACHMAN. With an introduction by PAUL C. FREER. New York, The Macmillan Company. 1899. Pp. xviii + 299. \$1.50.

The Arithmetic of Chemistry. JOHN WADDELL. New York and London, The Macmillan Company. 1899. Pp. viii + 133. 90 cents.

Algemeine Erdkunde. J. HANN, ED. BRÜCKNER and A. KIRCHHOFF. III., Abteilung Pflanzen- und Tierverbreitung. ALFRED KIRCHHOFF. Prague. Wien und Leipzig, F. Tempsky. 1899. Pp. xi + 327.

SCIENTIFIC JOURNALS AND ARTICLES.

The Botanical Gazette for March contains the following papers: D. H. Campbell: 'Notes on the structure of the embryo-sac in *Sparganium* and *Lysichiton*,' pp. 153-166, with one plate. This is a continuation of the author's studies of the primitive monocotyledons. The discovery of special interest is the extraordinary development of the antipodal cells in *Sparganium*, another evidence of the variable nature of the antipodal region. H. C. Cowles: 'The ecological relations of the vegetation on the sand

dunes of Lake Michigan,' pp. 167-202, with eight photographs. This very complete ecological study of the dune floras is continued from the February number. A special feature of this part is the discussion of embryonic dunes. The active or wandering dunes are also taken up and will be completed in a subsequent number. The following briefer articles appear: Ralph E. Smith: 'A new *Colletotrichum* disease of the Pansy;,' E. J. Hill: 'A new biennial-fruited oak,' with two plates; Elias Nelson: 'The Wyoming species of *Antennaria*,' in which eight new species are described. Numerous Book Reviews and Notes for Students complete the number.

SOCIETIES AND ACADEMIES.

ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

THE 289th regular meeting of the Anthropological Society was held Tuesday, March 28, 1899. Dr. J. Walter Fewkes made a communication on the 'Winter Solstice Altars at Hano,' a Tewan pueblo in Tusayan. He began by saying that the Territory of Arizona is covered with mounds or ruins indicative of the habitations of prehistoric pueblo people, but that it is evident that these villages were never simultaneously inhabited. Their distribution shows that this agricultural, aboriginal population of Arizona was more evenly distributed over the Territory in ancient times than at present. The presence of nomadic enemies—Utes, Apaches, Navajos and others—had led to a concentration of the pueblo aborigines of this region into limited areas, a movement which began in the 15th century and was continued in the two following. The so-called province of Tusayan was one of those centers of concentration or refuge, and the inhabited pueblos of the area now contain some of the descendants of the survivors of the abandoned villages between the Mojollones Mountains and the Utah boundary.

Three of these Tusayan pueblo—called Walpi, Siteomori and Hano—are situated on one mesa, not more than a gunshot apart. Dr. Fewkes showed how Walpi had been founded by clans driven southward from the Colorado River, and how their pueblo had grown by successive incoming clans from south and east. At the end of the 17th century the hostile nomads had so

closed in on Walpi that they swarmed in their farms, and utter annihilation stared the Hopi in the face. The Governor of Walpi sent to New Mexico for help, and after four appeals a band of Tewa warriors from a pueblo in the upper Rio Grande valley went to his aid. These warriors drove back the Utes, and in return for this help, the Tewa were given a site for their home near the main trail to the mesa upon which Walpi is situated. The village which they built is now called Hano. For two centuries the successive generations of inhabitants of Hano have remained Tewan in their customs in the country of their adoption. Hano preserves the Tewan language, although, by marriage with the neighboring Hopi, the consanguinity of the inhabitants is more Hopi than Tewa. Similarity of language is not always a sign of blood kinship. There are also many Tewan customs in marriage, mortuary and other rites in Hano, but the most characteristic of all are the religious festivals. The most instructive of these are the winter-solstice rites.

Of all expressions of religious sentiment objects like fetishes and ceremonial paraphernalia are the least variable from generation to generation. Mythology changes as man advances in culture or lives in a new environment, and accretions in form of myths to adjust worship to the spirit of the times multiply from generation to generation. Expression of the religious feeling through acts or dramas called ceremonies is more conservative than through myth and less modified by the evolution of culture, and new myths are invented to harmonize and explain ceremonies handed down from ancient times. The objects used in worship—fetishes, idols, paraphernalia—change even less than rites or myths, and reflect better than both the true ancient religious sentiment of which they are expressions, and are, therefore, of preeminent importance to the ethnologist in the study of ethnographic religion.

These ceremonial objects are very numerous among the Hopi; and their installation in sacred rooms, at times of great ceremonies, is called an altar. The two altars at Hano during winter-solstice rites were described in detail. The most striking fetishes upon them were clay images of the Great Snake. There were also